

WMO CAeM/AeMP OPERATING PLAN PREPARATION

(Submitted by the WMO Secretariat)

Summary and Purpose of Document

This document provides an outline of the WMO Operating Plan for 2020 to 2023, including an excerpt of those aspects pertaining to aeronautical meteorological services.

This document also addresses the development of a CAeM Operating Plan for 2019 and a look-ahead for 2020 to 2023 in support of the Aeronautical Meteorology Programme (AeMP).

ACTION PROPOSED

The Management Group (MG) is invited to:

- (1) note the information contained in this paper; and
 - (2) consider the finalisation and consolidation of the CAeM expert team and expert networks terms of reference and work plans to serve as the CAeM Operating Plan for 2019 and look-ahead for 2020-2023 in support of the Aeronautical Meteorology Programme (AeMP).
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1. OPERATING PLANS

WMO Operating Plan 2020-2023

1.1 As alluded to in [CAeM-MG-2019/PPT. 3.4](#), the 18th World Meteorological Congress (Cg-18) in June 2019 will, inter alia, consider the WMO Strategic Plan (SP), Operating Plan (OP) and Results-based Budget (RBB) for the next financial period, 2020 to 2023 inclusive, included in the following working documentation:

- (1) Cg-18/Doc. 3(1) – WMO Strategic Plan 2020-2023;
- (2) Cg-18/INF. 3(1) – WMO Operating Plan 2020-2023; and
- (3) Cg-18/Doc 3(2) – WMO Budget 2020-2023.

These documents are currently available via: <http://meetings.wmo.int/Cg-18/>

1.2 The OP 2020-2023 is structured along sixteen Strategic Objectives (SOs) defined in the WMO SP 2020-2023. It possesses a cascading flow of elements from Long-Term Goals (LTGs) and SOs to outcomes/benefits to Members, to outputs and milestones, to activities. For each SO, a set of performance indicators is presented at the outcome level as well as information on the allocation of regular budget resources and, when available, voluntary contributions. Selected regional aspects and priorities are highlighted based on a WMO Monitoring and Evaluation system, data collected through the Country Profile Database (CPDB), and information provided by regions. The WMO programmes, constituent bodies and key partners involved in the implementation of each SO are also listed.

1.3 In the context of aeronautical meteorological services, these are mainly addressed under LTG 1 (*Better serve societal needs: Delivering authoritative, accessible, user-oriented and fit-for-purposed information and services*) and SO 1.4 (*Enhance the value and innovate the provision of decision-supporting weather information and services*). An excerpt of the OP 2020-2023 in this regard is given at the [Annex](#) to this document here.

1.4 In addition, the OP 2020-2023 consists of two parts:

- (1) Part I presents the core outcomes, outputs and activities of WMO policy-making organs (Cg and EC), constituent bodies (RAs, TCs) and Secretariat in implementation of the Organization's mandate (under a zero nominal growth (ZNG) budget); and
- (2) Part II lists Additional Initiatives (AIs) designed to accelerate, scale up and broaden SO implementation in key focus areas as well as leverage investments in hydrometeorological technology and development. AIs that receive funding will be incorporated into Part I.

1.5 It is worthwhile to note that the OP 2020-2023 will be adjusted, as necessary, following Cg-18.

1.6 Cg-18 will also make decisions on the structure of its constituent bodies for 2020-2023 as part of WMO Constituent Bodies Reform ('WMO Reform'). At time of writing, it is expected that WMO Reform will result in the dissolution of the current (eight) technical commissions, including CAeM, and the establishment of two new technical commissions (COIIS and CSA¹) as well as other new constituent bodies (including Research Board, Science Advisory Panel and Technical Coordination Committee).

¹ Commission for Observation, Infrastructure and Information Systems (COIIS) and Commission for Weather, Climate and related Environmental Services and Applications (CSA).

CAeM Operating Plan 2019 and look-ahead to 2020-2023

1.7 In view of the foregoing and notwithstanding the potential implications of WMO Reform, there is a prevailing need for the CAeM Management Group to consider the operating plan needs of the Commission in support of the Aeronautical Meteorology Programme (AeMP) for this final year of the current financial period (2019) as well as a look-ahead of the needs for the next financial period (2020 to 2023).

1.8 Through Resolution 2 (CAeM-16), the Commission agreed that *'the WMO Operating Plan 2020–2023 should reflect the expected outcomes and benefits for Members, use the agreed performance indicators, and detail outputs and milestones, activities, risks and mitigation measures. This should be done at a global level and cover any associated regional aspects. In addition, current programmes, working bodies and partners should be included'*.

1.9 Resolution 2 (CAeM-16) also requested *'the president of CAeM to assist the Secretary-General in the strengthening and finalization of the WMO Operating Plan 2020–2023 in respect of aeronautical meteorological services related to all relevant strategic objectives, prior to its submission to the Eighteenth World Meteorological Congress in 2019'*.

Note. — The CAeM-16 report is [available here](#) as WMO-No. 1222.

1.10 Respecting Resolution 2 (CAeM-16), the WMO OP 2020-2023 does reflect, to a significant extent within LTG 1 and SO 1.4, the priority themes established by the Commission.

1.11 The CAeM expert team (ET) and expert networks (EN) are, at time of writing, undertaking the final development of their respective terms of reference and work plans. These materials, once finalised and consolidated, can serve as the CAeM Operating Plan in support of the AeMP for this final year of the current financial period (2019). They can also serve as a basis for the work of the Commission (or its successor) in the next financial period (2020 to 2023).

1.12 Considering the ET and EN progress reports to be addressed under CAeM-MG-2019/Docs. 4.1(1) to 4.1(5) inclusive, the Management Group should take the opportunity to undertake a final review of the TORs and work plans in view of determining their suitability to serve as the CAeM Operating Plan for 2019 and the look-ahead for 2020-2023.

EXCERPT OF THE WMO OPERATING PLAN 2020-2023

Note. - The following is subject to change as a result of Cg-18 in June 2019

Long-Term Goal 1: Better serve societal needs: Delivering authoritative, accessible, user-oriented and fit-for-purpose information and services						
Strategic Objective 1.4: Enhance the value and innovate the provision of decision-supporting weather information and services						
Budget (in thousands of Swiss francs): <i>Note: Regular Budget (RB) and Voluntary Contributions (VC) resources (staff & non-staff)</i>		RB (CHF)	% of total RB	VC (CHF)	Comments (VC): IGAD-HYCOS Project Trust Funds (2012), WMO Global Hydrometry Support Facility Trust Fund (HydroHub)	
		12,114.6	4.6%	2,000.0		
Outcomes/Benefits for Members (SP Focus): <ul style="list-style-type: none"> ◦ Enhanced and increased weather services by uptake of modern technology in service delivery and quality management principles. ◦ New weather and water prediction services designed and implemented for the specific needs of megacities and other urban areas. ◦ NMHSs provided with further guidance and assistance in the assessment and enhancement of socioeconomic benefits of their services. ◦ Principles and guidance for successful public-private engagement established as well as a continuous dialogue between players and stakeholders facilitated based on collaboration and mutual reinforcement. ◦ International standards, quality control mechanisms and recommended practices developed and adopted in a holistic manner for all service areas based on best national practices. 		Performance Indicators:		Baseline 2019	Target 2021	Target 2023
		1.4.1 Number of Members with QMS for selected services (aviation, marine, EWS)				
		1.4.2 Number of Members with socioeconomic benefit analysis conducted in the past 5 years				
		1.4.3 Number of Members with established public/private/academia engagement on: (a) service delivery and (b) maintenance of networks				
		1.4.4 Number of Members using (a) web applications and (b) social media in service delivery				
Outputs and Milestones:				2020	2021	2022
A. Service delivery common to Members (QMS, competency, polar)						
Increased compliance with technical regulations (e.g. aviation, marine and public services) and monitoring against the WMO Strategy for Service Delivery				Assessment conducted to gauge the level of compliance	Improvement plans developed, reviewed and refined	Assessment conducted to gauge the level of compliance
WMO Competency Frameworks for public weather services, aviation, marine, tropical cyclones and disaster risk reduction forecasters, the Quality Management Framework and the WMO Strategy for Service Delivery implemented						WMO Competency Frameworks completed
						Implemented by 60% of Members

Enhanced awareness of the benefits of meteorological services on key application and/or user segments (e.g. aviation, marine, general public)	Regular communication of news and information material	Regular communication of news and information material	Regular communication of news and information material	Regular communication of news and information material
Enhanced utilization by Members of GDPFS and WIS with respect to improved service delivery (<i>aligns with SO 2.2 and SO 2.3</i>)				Effective utilization/awareness by 90% of Members
Service delivery to polar and high mountain regions by NMHSs enhanced	Status and milestones of service delivery determined	Priority needs for marine services established	Implementation of marine services initiated in line w/ Polar Code	Strategy for Service Delivery implemented by all Members
Strengthened capacity of Members to conduct socio-economic benefit assessment	In at least 1 region	In at least 1 region	In at least 1 region	In at least 1 region
B. Public Weather Services				
Training modules on impact-based forecast (IBF) and warning services included in the curricula of WMO RTCs as part of implementing the WMO PWS Competencies (<i>aligns with SO 1.1</i>)	Strategy for developing IBF training curricula in RTCs completed			Training modules in use in RTCs
Revised Multi-Hazard Impact-based Forecast and Warning Services (WMO No. 1150) incorporating methods to assess likelihood of impact using NWP/EPS outputs produced (<i>aligns with SO 1.1</i>)	Methods to assess likelihood of impact using NWP/EPS incorporated			Revised and augmented version published
Guidelines on integrated operational platforms for urban service delivery developed and training conducted in all RAs	Regional workshops in at least two regions	Regional workshops in at least two regions	Regional workshops in at least two regions	
Enhanced provision of decision support services to land transport				10% extra countries per RA initiate services

Channels of dissemination and communication of services improved/developed in NMHSs of developing countries, LDCs and SIDs (<i>aligns with SO 4.1</i>)	10 Members assisted	10 Members assisted	10 Members assisted	10 Members assisted
Standard Interfaces (e.g. protocols or APIs) developed by making use, as required, of artificial intelligence, big data and public-private partnerships to provide easy access by aggregators of weather forecasts and warnings with full attribution to NMHSs	Concept adopted; implementation roadmap developed; funding mobilized to implement proof-of-concept pilot			At least 5 countries per region have developed Standard Interfaces
C. Aeronautical Meteorological Services				
WMO-No. 49, Technical Regulations, Volume II and/or associated WMO manuals, guides and other publications aligned with ICAO Annex 3 – <i>Meteorological Service for International Air Navigation</i>	WMO-No. 49, Vol. II, AMD 79 update; WMO-731/732	WMO-904 update	WMO-No. 49, Vol. II, AMD 80 update; WMO-No. 732	WMO-904 update
Long-term plan for the Aeronautical Meteorology Programme (LTP-AeMP) aligned with WMO Strategic and Operating Plans and ICAO Global Air Navigation Plan	First draft of LTP-AeMP second edition and community consultation	Final draft of LTP-AeMP second edition taking into account community feedback	(Continuation) Final draft of LTP-AeMP second edition taking into account community	Endorsement and publication of LTP-AeMP second edition and associated outreach
Information/data exchange policies, coordinated between WMO and ICAO, supporting the integration of aeronautical meteorological information into air traffic management systems and decision support	First draft of policy and community consultation	Draft of policy taking into account community feedback	Final draft of policy taking into account community feedback	Endorsement and publication of the policy and associated outreach
Scientific and technological research and innovation/demonstration, coordinated between WMO and ICAO, to improve the monitoring and forecasting of aviation hazards enabling impact-based decision-support aeronautical meteorological services	Tools/ techniques identification and demonstration	Tools/ techniques identification and demonstration	Aeronautical Meteorology Scientific Conference (AeroMetSci)	Endorsement and publication of conference outcomes and associated outreach

Climate change and variability impact assessment on aviation operations (ground and air, downscaled to local level where required)	Climatological variation analyses and impact assessment	Development and publication of first report/ guidelines and associated outreach	Climatological variation analyses and impact assessment	Development and publication of second report/ guidelines and associated outreach
Communication and outreach on aeronautical meteorological matters	Newsletters, feedback surveys, focal point listings	Newsletters, feedback surveys, focal point listings	Newsletters, feedback surveys, focal point listings	Newsletters, feedback surveys, focal point listings
D. Marine Meteorological Services				
Updated Manual on Marine Meteorological Services (WMO-No 558), Guide to Marine Meteorological Services (WMO-No 471), Technical Regulations, WMO-No.9 Volume D, IMO Resolution A1051, Guide on Wave Analysis and Forecasting (WMO-No 702), Storm Surge Forecasting Guide (WMO-No 1071), and Sea-Ice Information Services (WMO-No 574)	WMO-No 702	WMO-No 1071	WMO-No 558 and WMO-No 471	WMO-No 574
Enhanced awareness of Members and users about marine meteorological hazards on marine and coastal activities (<i>aligns with SO 1.1</i>)	Implementation of assessment results from 2018/2019			
Service delivery model for S-412 and S-411 formats used on shipping navigation systems	Standard agreed by IHO			Service delivery model established
Strengthened cooperation, coordination and collaboration with IMO and IHO and other relevant maritime safety stakeholders in the maintenance of standards in meteorological service for marine navigations as defined under the UN Convention for Safety of Life at Sea (SOLAS) and Polar Code	Input to Maritime Safety Committee (IMO) and NCSR	Input to Maritime Safety Committee (IMO) and NCSR	Input to Maritime Safety Committee (IMO) and NCSR	Input to Maritime Safety Committee (IMO) and NCSR
Strengthened cooperation, coordination and collaboration with IAEA, IMO and other relevant emergency response stakeholders in the establishment and maintenance of standards in meteorological service for marine environment emergency response as defined under MARPOL and other relevant international conventions	Delivery of ETMEER products	JCOMM-6 to decide future of ETMEER		
Strengthened cooperation, coordination and collaboration with oil and gas industry, ensuring open exchange of information and raising the awareness standards in meteorological service for marine activities associated with this industry	Input to Oil and Gas Met Ocean Committee	Input to Oil and Gas Met Ocean Committee	Input to Oil and Gas Met Ocean Committee	Input to Oil and Gas Met Ocean Committee

E. Tropical Cyclone Services				
Impact-based tropical cyclone forecasting/warning products developed (<i>aligns with SO 1.1</i>)	Evolving product development	Evolving product development	Evolving product development	3-5 products in operational application in over 50% of Members prone to tropical cyclones
G. Public Private Partnerships (PPP)				
PPP and Global Weather Enterprise (GWE) guidance material containing sectoral and national good practice examples developed	Publish guidelines; collect good practices	Update	Update	Update or new edition
Analytical studies on sustainable business models for service delivery with public-private-academia engagement conducted	Conduct study	Publish analysis and recommended business models	Pilot projects on business models	Pilot projects on business models
National initiatives for PPP established	Collect existing practices; prepare framework	20 Members	30 Members	Publish best practices summary
Regular Global Weather Enterprise events and ensure outreach to Members	GWE event	Regional event	GWE event	Regional event
Activities: Public Weather Services <ul style="list-style-type: none"> ◦ Develop Implementation Strategy based on the Multi-Hazard Impact-Based Forecast and Warning Services (WMO No. 1150). ◦ Assist NMHSs to develop partnerships for access to impact data. ◦ Organize training workshops and pilot projects to assist Members in implementing delivery of impact-based forecasting services, including enhanced digitization of impact-related products. ◦ Develop impact-based forecasting training modules in collaboration with RTCs. 	Risks: <ul style="list-style-type: none"> ◦ Failure to secure services of volunteer experts. ◦ Ineffective uptake of related programme activities due to lack of capability of NMHSs in LDCs and some developing countries. ◦ Risks associated with the delivery of services by the private sector. 	Mitigation measures: <ul style="list-style-type: none"> ◦ Optimize meetings and/or run in synergy with other events to reduce time away from home base. ◦ Seek XB resources for training workshops and other capacity building initiatives. ◦ Measures to address risks associated with public-private partnerships are being formulated. 		

- Develop guidelines for implementation of operational urban environmental service delivery and assist Members to develop integrated operational platforms through training, sharing of good practice, twinning, mentoring, pilot projects and enhanced engagement with municipal authorities and key stakeholders.
- Provide training and guidelines to develop Members' capacity in (a) urban-specific weather, (b) urban flooding, (c) air quality services and (d) coastal urban services.
- Organize training activities to strengthen the capacity of NMHSs to deliver services to (a) the land transport sector and (b) polar and high mountain regions.
- Organize training workshops and provide guidance material to NMHSs (especially in developing countries, SIDs and LDCs) on the development and improvement of their channels of dissemination and communication.
- Develop Common Interfaces for Service Delivery (CISD) to provide easy access by aggregators of weather forecasts and warnings for dissemination with full attribution to NMHSs.
- Organize meetings and training to further CISD development.
- Conduct training workshops to strengthen Members' capacity to assess and demonstrate socio-economic benefits and facilitate holistic service delivery for sustainable development.

Aeronautical Meteorological Services:

- Develop updates to WMO technical regulations and other publications addressing aeronautical meteorological service provision to align with ICAO Annex 3.
- Mature a long-term plan for the Aeronautical Meteorology Programme aligned with WMO and ICAO strategic plans.
- Develop new or improved meteorological hazards prediction through scientific research and technological innovation relevant to trajectory-based operations and air traffic flow management.
- Develop new or improved aeronautical meteorology information service standards and governance models, including information and data exchange policies, quality management system standards and cost recovery principles.

- Develop new or improved education and training materials, including competency assessment best practice, for personnel providing meteorological service for international air navigation.
- Assess the impacts of climate change and variability on aviation operations at airports and in airspace and communicate these findings with ICAO and other relevant aviation stakeholders.
- Communicate (via newsletters, feedback surveys, websites etc.) with the aeronautical meteorology community on the latest and upcoming developments, including key contributions from partner organizations such as ICAO.

Marine Meteorological Services:

- Develop updates to WMO-No. 558, WMO-No.471, Technical Regulations, WMO-No.9 Volume D, IMO Resolution A1051.
- Develop new and improved information on meteorological and other phenomena hazardous to marine and coastal areas through innovative scientific research and technological advancement as well as the transition from research into operations.
- Develop new and improved marine meteorology and coastal service standards and governance models, including information and data exchange policies, quality management system standards and cost recovery principles.
- Assess the impacts of climate change and variability on vessels and infrastructure at sea and communicate these findings with IMO and other relevant marine stakeholders.
- Assess the impacts of climate change and variability on vessels and infrastructure in coastal areas including, ports and harbours and other coastal operations, and communicate these findings with relevant coastal stakeholders.
- Continue JCOMM coordination activities with the IOC, to advance the technical support required to carry out the above service activities.
- Communicate (via newsletters, websites and such like) with the marine meteorology and coastal community on the latest and upcoming developments, including key contributions from partner organizations such as IMO, IHO, IOC and UN-Oceans.
- Produce new and improved education and training materials in marine meteorology, including competency assessment best practice for marine meteorological personnel.

<p>Tropical cyclone services:</p> <ul style="list-style-type: none"> ◦ Identify and coordinate the development of impact-based tropical cyclone forecasting and warning products. ◦ Coordinate the establishment of Global Tropical Cyclone Competencies as per approval by relevant constituent body, and integrate them into overall WMO Competency Framework. ◦ Coordinate the development of impact-based tropical cyclone forecasting/warning products by TC RSMC and national centres. <p>Public-private partnerships:</p> <ul style="list-style-type: none"> ◦ Conduct regular GWE Forums and regional events in cooperation with partners (GFDRR, HMEI, others); ◦ Conduct studies on the implementation of business models; ◦ Write and publish guidance material; ◦ Ensure communication and outreach through the WMO website and other means; ◦ Work with Members on establishment of national platforms for coordination and collaboration with private sector, academia and other non-State actors. 		
<p>Regional Aspects</p> <ul style="list-style-type: none"> ◦ <i>QMS for aeronautical meteorological service provision</i> : lowest implementation in RA II (20% no, 3% partial), RA IV (9% no, 32% partial) and RA I (9% no, 23% partial). RA III: 33% partial. RA V (14% no, 10% partial). Highest implementation: RA VI (94% yes). <i>Source: Survey 2016-2017.</i> ◦ <i>Tropical Cyclone / Hurricane Services</i> strong in affected Regions with Committees and Panels extremely effective - efforts need to concentrate on IBF and last mile communications of IBF / Warnings. 		
Current Programmes	Working Bodies	Partners
Lead: PWS, MMOP, AeMP, TCP Contributing: GDPFS	EC, RAs, TCs, Research Board, Secretariat	ICAO, IATA, IMO, IOC/UNESCO, other UN agencies, HMEI